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SIZE AND POSSIBLE ORIGIN OF SAILFISH, *ISTIOPHORUS PLATYPTERUS*, FROM THE EASTERN ATLANTIC OCEAN¹

Although Morrow and Harbo (1969) considered the sailfish, *Istiophorus platypterus*, to be a single worldwide species, other workers believe that the Atlantic and Pacific forms are separate species (Nakamura et al. 1968; Nakamura 1974). It has long been recognized that Indo-Pacific specimens, particularly those found along the coasts of Panama and Mexico, attain a much greater size

than do their Atlantic counterparts. In addition, the form of the spinous dorsal fin differs in fish from the two ocean areas. The International Game Fish Association (IGFA), which keeps detailed and precise records of the largest fish caught in various sportfishing categories, maintains separate records for Indo-Pacific and Atlantic sailfish. At present, the largest sailfish caught by sportfishing gear in the Pacific weighed 100.2 kg, and of the 14 different line test categories recorded by IGFA, only two record Pacific sailfish weighed <70 kg. In contrast, the largest Atlantic specimen weighed 58.1 kg and over half of the record catches were <50 kg (International Game Fish Association 1980). Morrow and Harbo (1969) stated that it was probable that improved nutrition, better conditions for growth, or some other favorable environmental condition was responsible for the attainment of the greater size in Indo-Pacific sailfish.

Size data for Atlantic sailfish caught by the Japanese longline fishery in various areas of the Atlantic have recently become available in the annual publications of the International Commission for the Conservation of Atlantic Tunas.² These data show that unusually large sailfish also occur in the Atlantic, specifically in the eastern Atlantic off the coast of Africa between lat. 0° and 20° S (Figure 1; Areas F, G). Size frequencies from the region indicate fish of substantially greater size than from any of the other areas in the Atlantic where size data from sailfish caught by the longline fishery were available (Figure 2). I calculated the weights of eastern Atlantic specimens using length-weight relationships developed by various authors (Table 1). The results (Table 2) show increasing variation in calculated weights as fish length increases; however, regardless of which

²International Commission for the Conservation of Atlantic Tunas, Madrid, Data Records Vol. 10, p. 303-304 and Vol. 11, p. 267-270.

TABLE 1.—Coefficients of the length-weight relationship for western Atlantic sailfish (Lenarz and Nakamura 1974; Jolley 1974) and eastern Pacific sailfish (Kume and Joseph 1969; Wares and Sakagawa 1974). All lengths are from posterior rim of orbit to fork except Jolley, which is from orbit to origin of caudal keels. Calculated weights will be in kilograms except for Lenarz and Nakamura which will be in pounds.

Author	No. of specimens	Size range	log ₁₀ a	b
Lenarz and Nakamura (1974)	244	15.8-62.5 in	-3.895	3.158
Jolley (1974) Male	182	76-156 cm	-5.784	3.342
Female	230	47-164 cm	-4.941	2.950
Kume and Joseph (1969)	28	134-205 cm	-3.936	2.416
Wares and Sakagawa (1974)	802	115-222 cm	-4.360	2.628

¹Southeast Fisheries Center Contribution No. 80-05M.

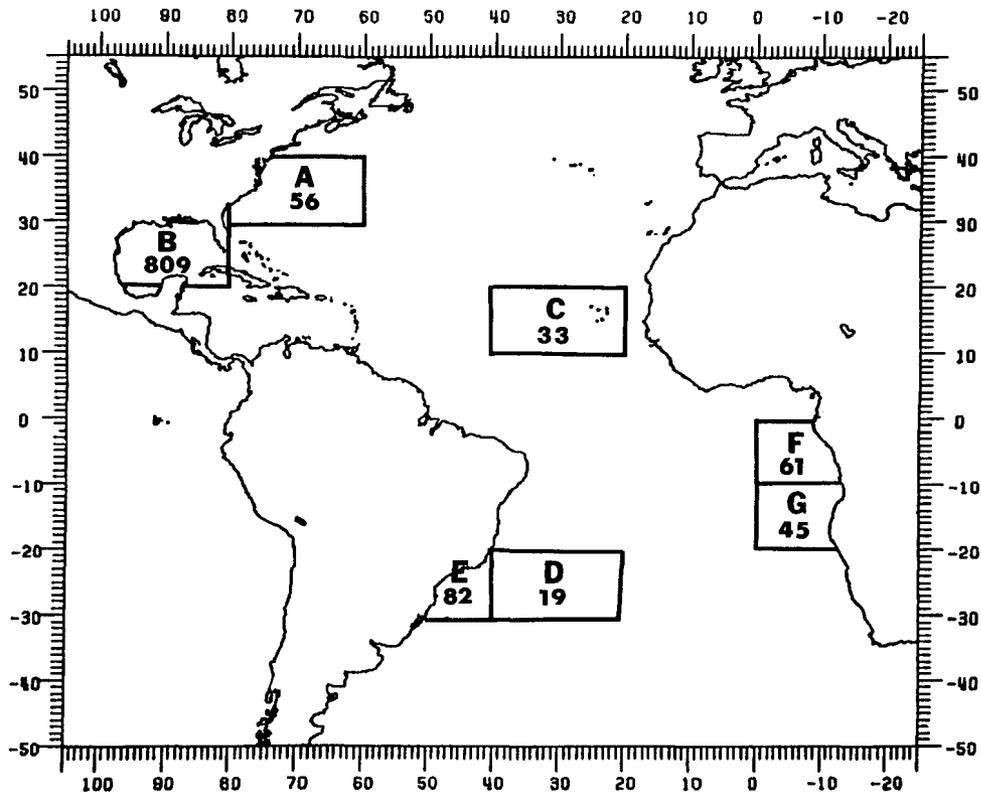


FIGURE 1.—Areas and number of sailfish sampled from the Japanese longline fishery in the Atlantic, 1975-76. Data are from Data Records 10, 11, International Commission for the Conservation of Atlantic Tunas (see text footnote 2).

TABLE 2.—Estimated weights of sailfish caught by longline gear in the eastern Atlantic (Figure 1; Areas F, G) using length-weight relationships from various authors.

Author	Smallest ¹ (148.5 cm)	Average (174.8 cm)	Largest (223.5 cm)
-----estimated weight, kg-----			
Lenarz and Nakamura (1974) ²	21.9	36.7	79.9
Jolley (1974) ³ Male	22.9	39.8	91.0
Female	23.2	37.7	78.3
Kume and Joseph (1969)	20.5	30.3	54.9
Wares and Sakagawa (1974)	22.2	34.2	65.2
Average length in other five areas 140.7 cm			
Average weight in other five areas 18.6 kg (Lenarz and Nakamura formula)			

¹There was one specimen measuring 116-120 cm fork length but was excluded from this demonstration.

²Lenarz and Nakamura conducted their calculations in inches and pounds. I converted results using their formula into kilograms for this demonstration.

³Although Jolley's formula indicates that males in the eastern Atlantic attain a greater weight at a given length than females, available evidence indicates that this is not true for western Atlantic sailfish. Only a few females in Jolley's sample were as large as the average-sized eastern Atlantic specimen and the indication that males attain a greater weight is probably a result of extrapolation of Jolley's formula beyond the limits of his data.

formula one uses, it is clear that the eastern Atlantic specimens are unusually large fish (it should be noted that estimated weights in Table 2 may be significantly affected by an unknown logarithmic bias inherent in the length-weight

parameters). Using Lenarz and Nakamura's (1974) formula, for example, the average weight of sailfish sampled in the eastern Atlantic was only 21.4 kg less than the current all-tackle world record for Atlantic sailfish, and the largest specimens were 21.8 kg larger than the all-tackle record. There is currently little sport fishing in the eastern Atlantic; however, between 1971 and 1975 seven world records were established for Atlantic sailfish off the coast of Angola, including the current all-tackle record of 58.1 kg.

There are striking similarities between the distribution of sailfish in the Pacific and Atlantic Oceans. In both oceans, sailfish appear to be most abundant on the western side and have a greater north-south range than on the eastern side (Koto et al. 1959; Kume and Joseph 1969; Ueyanagi et al. 1970). The largest specimens are apparently located on the eastern side of their respective oceans and in a fairly localized area. Size data on sailfish from the eastern Pacific presented by Kume and Joseph (1969) and Wares and Sakagawa (1974)

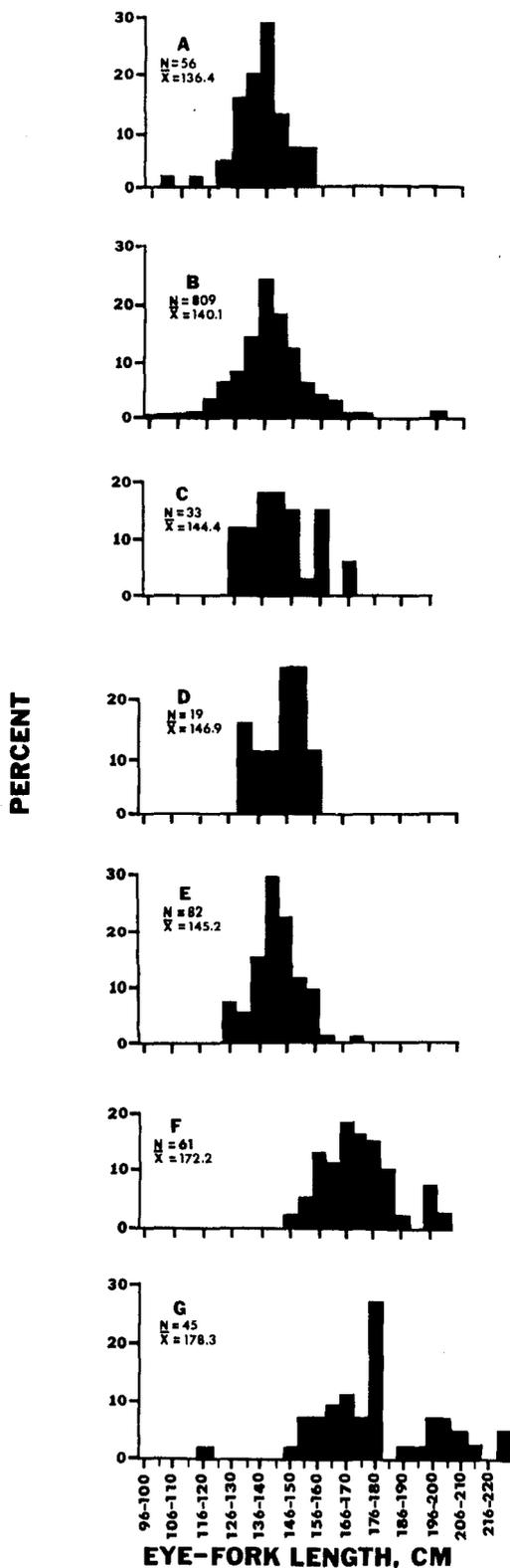


FIGURE 2.—Length frequencies of sailfish captured by the Japanese longline fishery in the Atlantic, 1975-76. Letters indicate areas from Figure 1.

agree quite well with similar data on eastern Atlantic specimens sampled off the coast of Africa, both in range and average length. Additionally, size frequencies of sailfish from the East China Sea (Koto et al. 1959) are quite similar to size data for western Atlantic sailfish given by Jolley (1977). In both the eastern Pacific and eastern Atlantic, sailfish occur in an area where a substantial surface fishery for yellowfin and skipjack tunas takes place. Fox³, in his analysis of the temporal and spatial relationships among tunas and billfishes in the Atlantic, showed a strong correlation between the occurrence of sailfish and yellowfin tuna in the Atlantic and a strong relationship between the occurrence of the two species and surface water temperatures.

There are also similarities in the environment on the eastern sides of the Atlantic and Pacific Oceans where the largest specimens of sailfish occur. Both areas have relatively shallow thermoclines. Thermal domes occur in both the eastern Atlantic (Mazeika 1967) and the eastern Pacific (Wyrski 1964) and probably influence the seasonal distribution of at least some oceanic fishes (Beardsley 1969).

It seems possible, therefore, that environmental conditions in both the eastern Pacific and eastern Atlantic favor rapid growth and the attainment of a large size in sailfish.

There is also the possibility that the group of large sailfish off Africa are immigrants from the Indian Ocean around the tip of South Africa. Other large oceanic fishes, such as the albacore, *Thunnus alalunga*, and the black marlin, *Makaira indica*, are suspected to have entered the Atlantic by this route (Koto 1969; Wise and Davis 1973), and Penrith and Cram (1974) reported that six species of billfishes have been recorded in waters west and south of the Cape of Good Hope. The sailfish, however, was not included in this group. Even though Penrith and Cram did not find sailfish in their samples, the presence of other istiophorids suggests that sailfish probably are present at times in this area.

The sizes of sailfish from the eastern Atlantic and the western Indian Ocean are similar. Merrett

³Fox, W. W., Jr. 1971. Temporal-spatial relationships among tunas and billfishes based on the Japanese longline fishery in the Atlantic Ocean, 1956-1965. Univ. Miami Sea Grant Tech. Bull. 12, 78 p.

(1971) examined 77 sailfish caught on longlines off East Africa and found that the majority were between 160 and 185 cm body length (center of orbit to tip of shortest caudal ray), which is consistent with the modes found for sailfish off Africa (Figure 2).

It seems possible, then, that when oceanographic conditions are favorable, sailfish move from the western Indian Ocean to the eastern Atlantic around the tip of South Africa. Based on the size samples available from the longline fishery in other areas of the Atlantic and size frequencies of sailfish caught in the sport fishery in the western Atlantic (de Sylva 1957; Jolley 1977), these fish apparently remain in a fairly restricted area off the coast of West Africa.

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